SEVERAL CULTURAL TRAITS OF CHESTNUT (*Castanea sativa* Mill) STANDS IN ROMANIA

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Abstract

Currently the chestnut species grows in the national forest fund in several distinct geographical areas, separated by a series of natural barriers, usually mountains. In some treaties and / or specialized studies there are summarized or detailed issues related to the area of chestnut and its vegetation conditions.

Currently there is a series of peculiarities about the site where the stands of chestnut vegetate, issues that have emerged over time and which were found in way we promote in culture and managing the stands of chestnut, evidenced in the end within the accumulated local experience.

The stands where vegetate the chestnut species can be pure or mixed with other indigenous species (common beech, sessile oak; Turkey oak, European sweet cherry, common hornbeam, sycamore, ash) or exotic, in different degrees of participation, having a regular structure.

Natural regeneration from seed of the stands where the chestnut vegetates is currently performed relatively difficult, because the sweet chestnuts do not get to be incorporated into the soil and germinated because of various reasons (valorification, consumption by fauna, etc.). Accordingly these stands can regenerate naturally in optimal conditions only vegetative or artificially through plantations.

Key words: stand, chestnut, management plan, structural characteristics, structural elements, data recorded

INTRODUCTION

Stand structure generally can be presented using structural elements (horizontal and vertical), qualitative characteristics and respectively a series of summary indicators (index of density, stability index, index of spacing, competition coefficient in crown, etc.). As a result, a series of structural characteristics can be expressed synthetically using specialized software (PROARB, VISUALIZATION STAND SYSTEM) for presenting these issues.

The structural, quality and synthesis characteristics of stands are directly related to physical-geographical environment (stationary conditions) with phytocenosis and zoocenoza respectively with human impact.

The objectives can be achieved by using specialized programs for research, study and analysis of stand structure refers to simulate their structure, an analysis silvicultural complex, realisation of a diagnosis silvicultural objectives, monitoring the health and vegetation stands, the

inventory of national forest fund, didactic activities specialized, doctoral studies, etc.

Depending on the objectives related to the analysis stand, it will be opted for the specialized program posing a high efficiency, a high degree of interactivity and require an input (the data entry) relatively low and provides a complex output (data output-results) complex and relatively explicit.

The research, study and analysis of spatial structure of pure, practically pure and mixed stands within the national forest fund where the chestnut vegetates is necessary because currently there are relatively few recent information regarding stands (Bolea, Chira, 2013).

Also, according to the specialized literature there are information relating to health of the pure and / or the mix stands of chestnut, stands which in the last two decades have been strongly affected by the *Phytophthora sp.* (Fodor, Şesan, 2014; Clemente et al., 2008; Chira et al., 2003), issues that may influence of the area extinction of this species.

Paradoxically, at present, because of climate change, given the ecological and cultural peculiarities of chestnut, there is the possibility of extending in culture in the national forest fund and agroforestry systems in this species (Damian, Crainic, 2012a; Damian, Crainic, 2012b; Serrada et al., 2008; Beldeanu, 2004).

MATERIAL AND METHOD

The case study was conducted between 2012-2014 in pure, practically pure and / or mixed stands of the chestnut from areas Baia Mare, Dobreşti-Codrii Cămării, Gurahonţ, Baia de Aramă-Tismana şi Călimăneşti. As a result, research and studies have been conducted in a number six stands of national forest fund (Damian, Crainic, 2012a; Damian, Crainic, 2012b; Pârnuţă, 2011; Pârnuţă et al., 2010; Stănescu et al., 1997).

As mentioned research methods used: bibliographic documentation, observation on itinerary, stationary observation, comparison, simulation, recording a digital format.

The issues relating to physical-geographical environment (forest site) were studied and analyzed from the management plans and specialty literature, being correlated with observations made in the field.

The data were recorded on the field in rectangular sample plots, which were installed in homogeneous portions of the stand. Therefore, there were established reference axis of the sample plots and were recorded for the trees inventoried the following elements: no., planimetric coordinates (X_i, Y_i), crown diameter horizontal projection on the directions of reference axes X and Y, the total height, height pruning, species, the average slope, the dimensions of the sample plot and total number.

The plane coordinates of trees from the sample plots were determined directly in the field by direct measurement of horizontal distances with millimeter graduated measuring-tape. As well, the diameter of the projection of crowns on the two reference direction was also determined by the graduated measuring-tape.

Total and pruning height of the trees was determined with dendrometer and a telescopic rod with millimeter divisions.

Data recorded in the field were implemented in an Excel file within the program PROARB 2.0 (Popa, 1999) to achieve the stands structure researched and studied, respectively to obtain profiles horizontal, vertical and 3D (photo. 1).

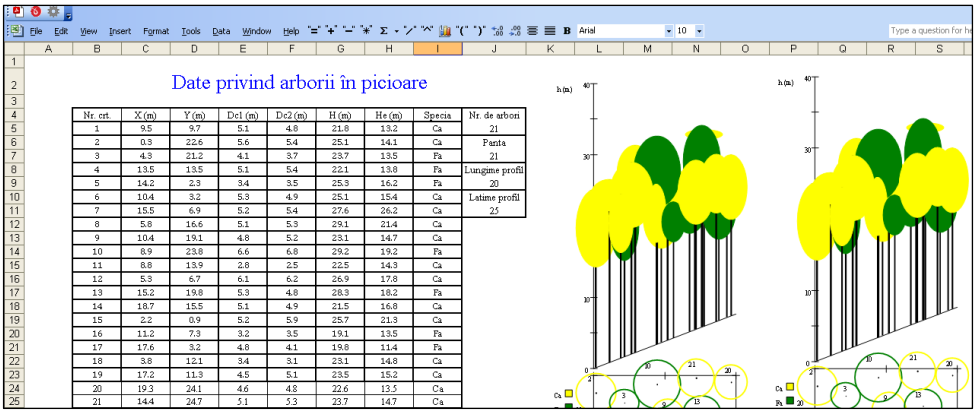

Photo.1. The program interface PROARB 2.0

Stands of chestnut studied were identified in the field using: management plans, forest management maps, inventory genetic resources and practical experience related to specific activities of the forestry sector.

RESULTS AND DISSCUSIONS

By processing the data recorded in the field it was obtained a series of results which are presented tabular and synthetically through the stands profiles in horizontal, vertical and 3D (perspective) section.

By analyzing and interpreting the results may be observed (see) some peculiarities of the stands structure of studied chestnut, which offers the possibility of establishing strategies on management (silvicultural interventions) now and in the future.

The main structural characteristics of studied chestnut stands and their afferent stational conditions were taken from the management plans of the corresponding management units in which there was carried out the research.

The structural elements associated to the studied stands, presented in Table 1 have the following meanings: u.a.-compartment; S-stand area in hectares; T.S.- forest site type; T.P.- forest type; Sol- soil type; T- stand age; K- crown density of the stand; Prov. - provenance; Mod reg. – regeneration mode; Cpz.- stand composition; V-stand volume; C.L.P.- relativ site class (***amenajamentele unităţilor de producţie).

Table 1

The structural characteristics of the chestnut stands studied in Romania and the associated stationary conditions

u.a.	S (ha)	TS	TP	Sol	T (years)	CLP	Cpz.	Mod reg.	Prov	K	V
D.S. Mehedinţi, O.S. Tarniţa, U.P. V											
123B	2.80	5232	4231	2401	50	II	10Cas	P	Nec.	0.7	809
D.S. Gorj, O.S. Tismana, U.P. V											
2D	13.60	5142	5121	2401	140	III	10Cas	ÎN	RN	0.8	5576
D.S. Vâlcea, O.S. Călimăneşti, U.P. VI											
104E	1.26	5153	5111	2201	55	V	7Cas3Nua	P	Nec.	0.7	79
D.S. Maramureş, O.S. Firiza, U.P. I											
63	1.39	5242	4214	3201	70	III	7Cas2Fa1Go	P	Nec.	0.8	311
D.S. Arad, O.S. Gurahonţ, U.P. III											
29G	9.80	6152	5323	2201	30	III	5Cas4Ca1Sac	P	Nec.	1.0	843
D.S. Bihor, O.S. Dobreşti, U.P. V											
48E	4.82	5153	5211	3102	100	II	10Cas	P	Nec.	0.8	2367

The forest site type in which grown stands of studied chestnut are represented by codes and the correlation between them is as follows according systematics since 1977 (***extras din îndrumarul pentru amenajarea pădurilor, 1984).

The forest site type that were identified: 5142-upland *Quercus petraea* forest site, Pm on pseudogley podzol with *Carex pilosa*, 5153-upland *Quercus petraea* forest site, Ps, brown soil with high target soil volume, with *Asarum europaeum*, 5232-submontainous *Fagus sylvatica* forest sites , Pm, medium podzol,with sub-medium target soil volume, with *Rubus hirtus*. 5242-submontainous *Fagus sylvatica* forest sites, Pm, brown soil with medium target soil volume, with *Asperula-Asarum*, 6152-upland mixed *Quercus spp*.forest sites, brown soil II.

The forest types that are found in stands of chestnut study are presented in continued according to systematic since 1977 (***extras din îndrumarul pentru amenajarea pădurilor, 1984).

4314-Submontainous beech (*Fagus sylvatica*) forest sites on superficial soil, on calcareous substrate (i), 4231-Submontainous beech forest sites with *Rubus hirtus* (m), 5111-regular *Quercus petraea* forest site with mull flora (s), 5121-*Quercus petraea* forest site with *Carex pilosa* (m), 5211-Mixed *Fagus sylvatica* and *Quercus petraea* forest site with mull flora, 5323-mixed forest with *Quercus petraea* site, medium productive (m).

The soil types which vegetate stands of chestnut that were carried out research and related codes, have been identified (***coduri de descriere parcelară, tabele de producție simplificate şi sistemul român de taxonomie a solurilor (SRTS-2003), 2008) and presented as follows: 2201-typical luvic soil, 2401-typical planic soil, 3102- mollic eutric cambisol, 3201-typical dystric cambisol.

In the stand of u.a. 29G, U.P. III, O.S. Gurahonţ were inventoried a total of 26 chestnut trees (Ca), in a rectangular sample plot size of 500 m^2.

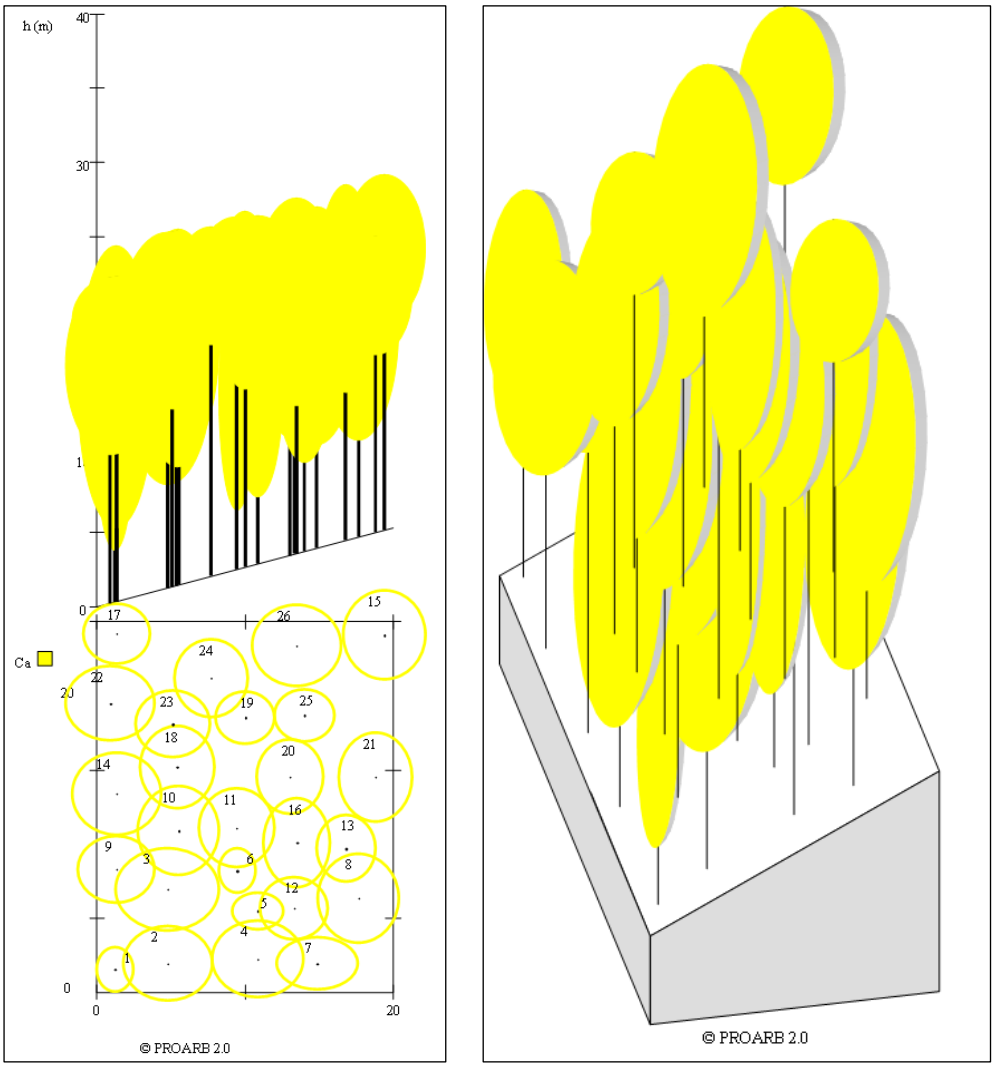

Fig. 1. The horizontal, vertical and 3D profil of the stand in u.a. 29G, U.P. III, O.S. Gurahonţ

From the analysis of the profile of fig. 1 it is noted that the stand of chestnut is pure having the composition 10Ca. It appears that it has a relatively high density and relatively unevenly spaced.

In the stand of u.a. 2D, U.P. V, O.S. Tismana, in a rectangular shaped sample plot with a size of 500 m_2, were inventoried a number of chestnut trees 30 (Ca).

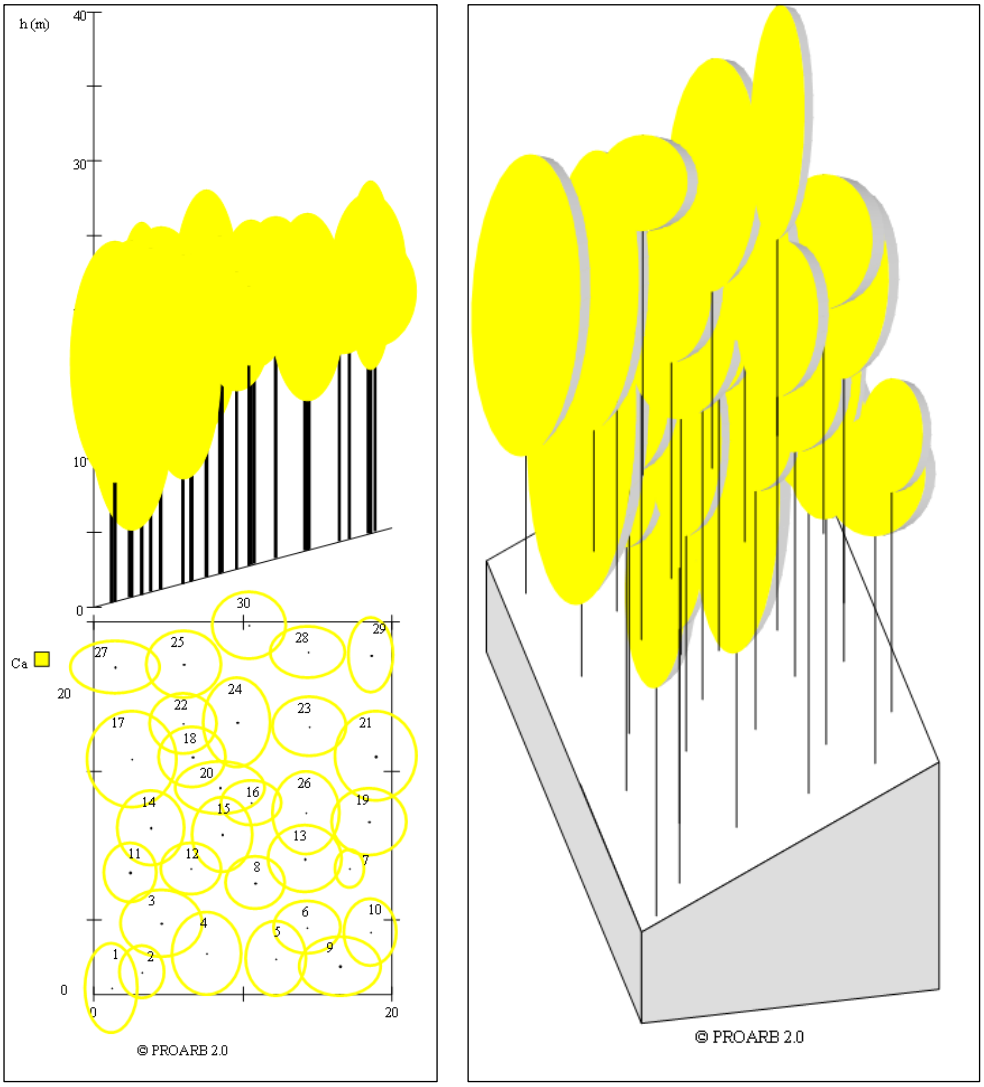

Fig. 2. The horizontal, vertical and 3D profil of the stand in u.a. 2D, U.P. V, O.S. Tismana

Analyzing the images in fig. 2 it is observed that the studied and synthetic presented chestnut stand in profiles below is pure having composition 10Ca, a relatively high density and relatively small spacing.

In the stand of u.a. 48E, U.P. V, O.S. Dobreşti in a sample plot size of 500 m^2 have been inventoried a total 21 trees, 17 from the chestnut species (Ca) and 4 from the beech species (Fa).

Fig. 3. The horizontal, vertical and 3D profil of the stand in u.a. 48E, U.P. V, O.S. Dobreşti

The stand of chestnut that is analyzed in profiles in fig. 3 is mixed with the composition as the number of trees 8Ca2Fa. It establishes that its density is relatively high and uneven spacing. It also highlights the presence of tree crowns related profiles, different size and shape.

In the stand of u.a. 123B, U.P. V, O.S. Tarniţa in a sample plot of 500 m^2 where it was inventoried in total 20 trees of chestnut species (Ca).

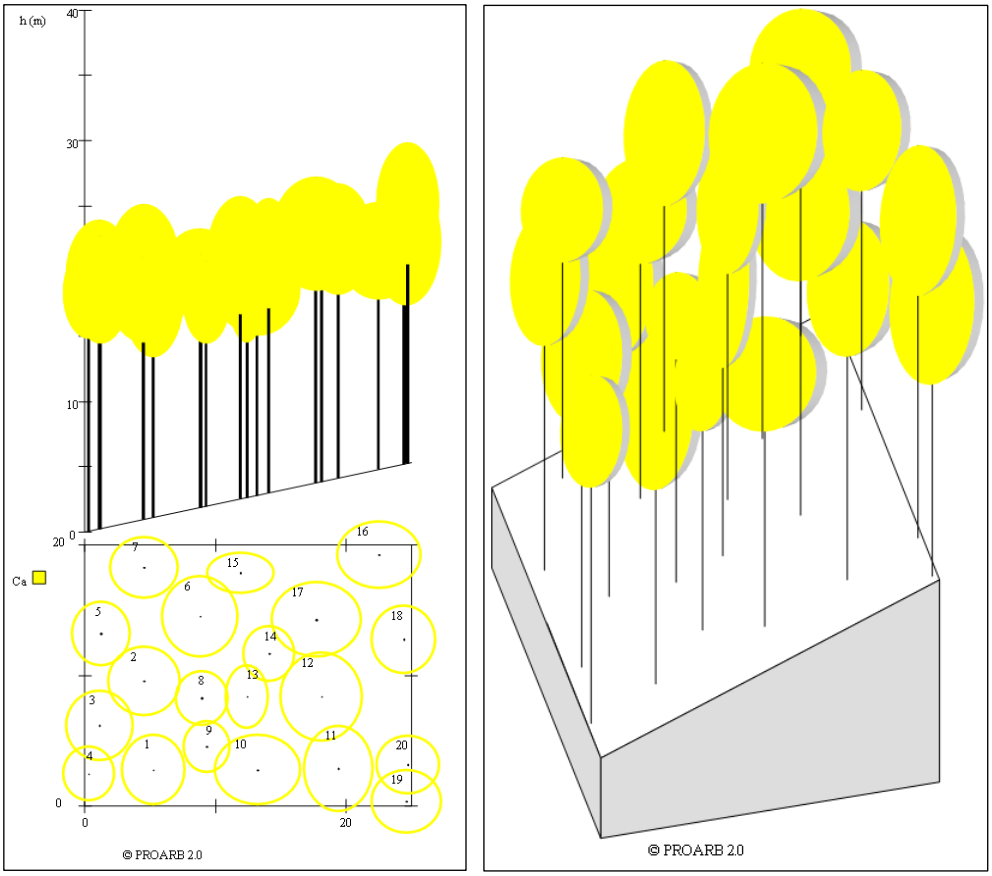

Fig. 4. The horizontal, vertical and 3D profil of the stand in u.a. 123B, U.P. V, O.S. Tarniţa

The stand of chestnut analyzed in the samples related to profiles in fig. 4, it is pure, having a composition 10Ca and is characterized by a density and an appropriate spacing.

In the stand of u.a. 104E, U.P. VI, O.S. Călimăneşti in a sample plot of 500 m^2, being inventoried a total 21 trees, 16 from the chestnut species (Ca) and 5 from the beech species (Fa).

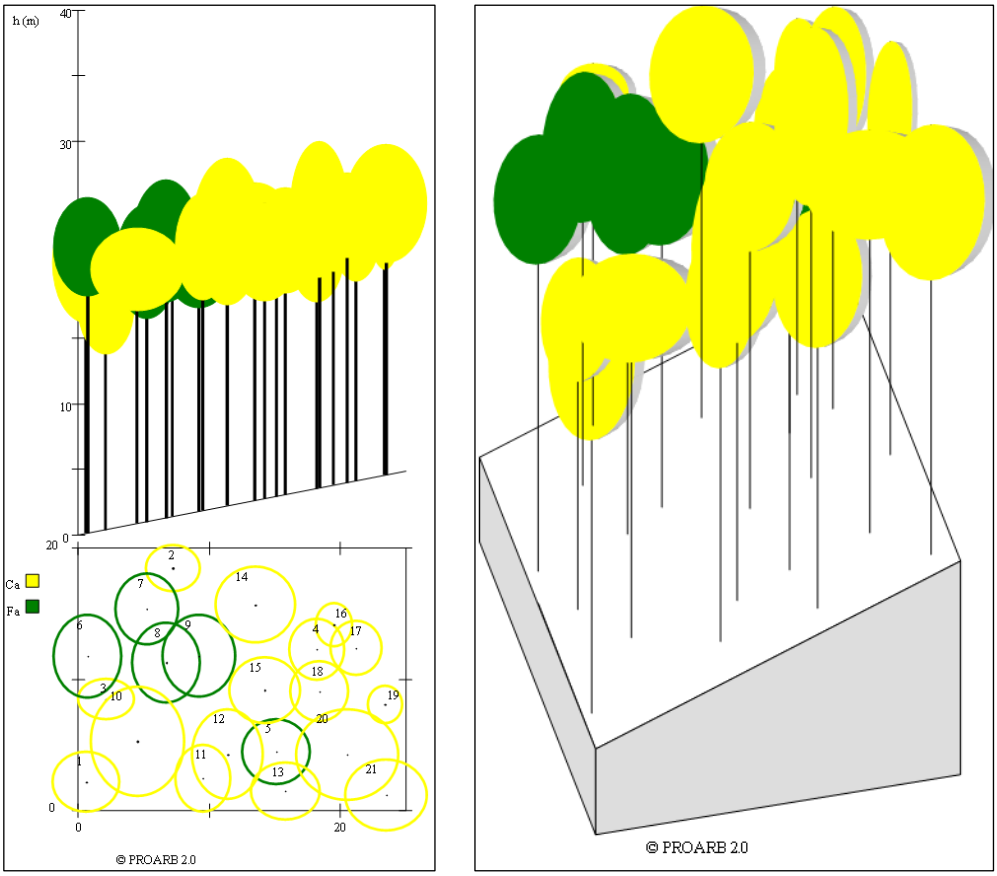

Fig. 5. The horizontal, vertical and 3D profil of the stand in u.a. 104E, U.P. VI, O.S. Călimăneşti

Analyzing the profiles of fig. 5 observed that the stand of chestnut is mixed, having composition with the number of trees 8Ca2Fa.

It is observed that it has a relatively high density and uneven spacing.

In the stand of u.a. 63, U.P. I, O.S. Firiza, in the sample plot of 500 m^2 of rectangular form, were inventoried 21 trees, 14 from the chestnut species (Ca) and 7 from the beech species (Fa).

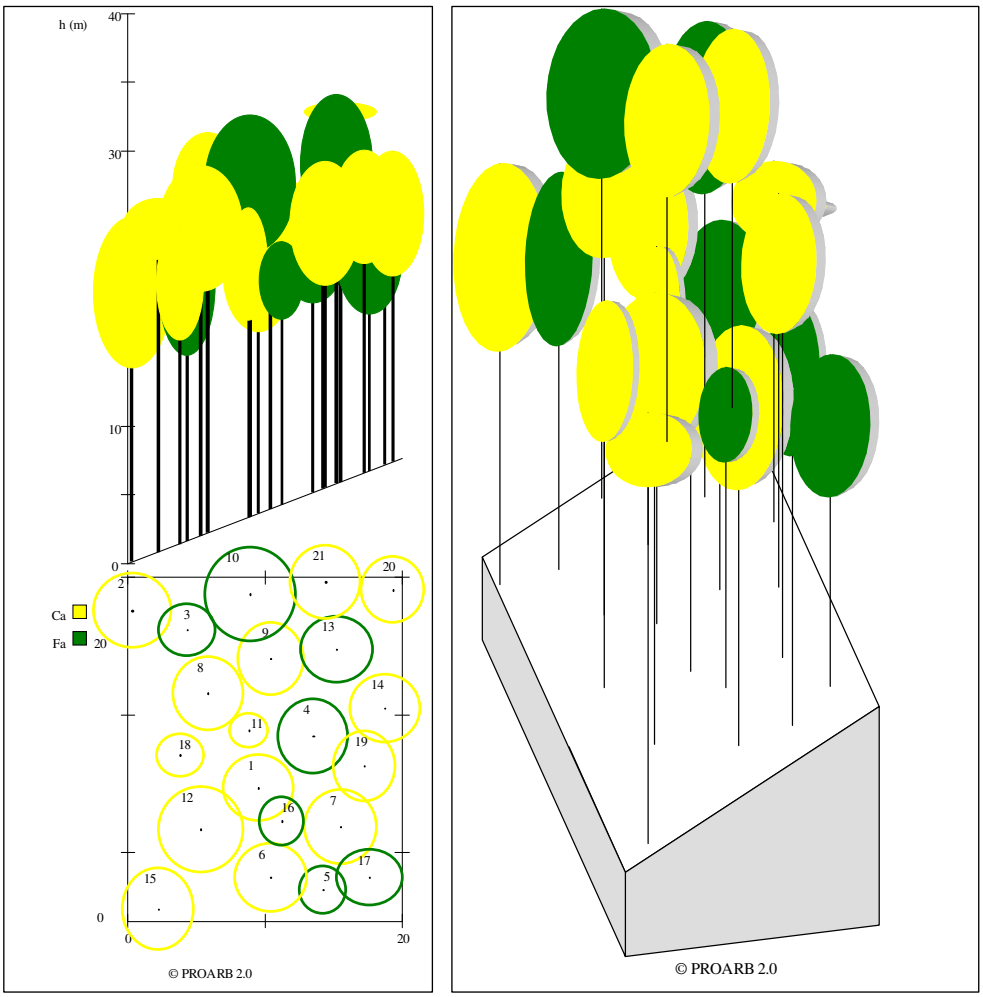

Fig. 6. The horizontal, vertical and 3D profil of the stand in u.a. 63, U.P. I, O.S. Firiza

The stand of chestnut sampled and studied in the profiles from the fig. 6 is mixed and the composition on number of trees is 7Ca3Fa, beech species is found in the form of groups between the specimens of chestnut. Stand density is normal and is one appropriate spacing. It is also noted that the trees from the studied profiles present relatively uniform crowns, which have slightly different dimensions.

CONCLUSIONS

From the analysis of stational characteristics related to analyzed and researched stands which grown chestnut species is found that this species grows in the national forest fund in the approx. 5 forest site types, 4 soil types, in 6 forest types.

It is noted that some of the studied stands grows in optimal conditions on soils that have developed on a limestone substrate, aspect that was noted and at other research and studies conducted in the national forest fund and in other countries, it is a peculiarity because specialty literature indicates that the chestnut is a species which does not like to vegetate on limestone soils.

Studied stands are presented that stands pure consist of specimens related *Castanea sativa* Mill species, and that mixt stands composed of chestnut species and various hardwoods corresponding hills mixed hardwood forest with sessile oak and beech, in varying proportions, with a regular structure, evens aged trees, single stage, the majority of medium to higher productivity.

Because sweet chestnuts are harvested and / or consumed by wildlife of hunting, natural regeneration from seed stands of chestnut is laborious or extremely difficult, because these stands can regenerate naturally only vegetative, given the high capacity of sprouts by the viable stubs.

It is noted that most young chestnut stands are artificial, resulting by plantations with midsize seedlings and without covering root, which is produced from seed (chestnuts), in forestry nurseries, having unknown provenance of most of the time.

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16. ** Amenajamentul unităţii de producţie VI, Ocolul Silvic Călimăneşti, Direcţia Silvică Vâlcea;
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